

1. A carrier head, comprising:
a housing to be secured to a drive shaft;
a base assembly;
a loading chamber controlling the position of the base assembly relative to the
5 housing; and

a flexible membrane having a generally circular main portion with a lower
surface that provides a substrate-mounting surface and a plurality of concentric
annular flaps secured to the base assembly, the volume between the base assembly
and the flexible membrane forming a plurality of pressurizable chambers.

2. The carrier head of claim 1, further comprising a retaining ring joined to the
base assembly.

3. The carrier head of claim 2, wherein the carrier head includes five
15 pressurizable chambers.

4. The carrier head of claim 1, wherein each chamber controls a downward
pressure by an associated segment of the main portion flexible membrane on a
substrate.

5. The carrier head of claim 1, wherein at least one of the annular flaps includes a
notch.

6. The carrier head of claim 5, wherein the notch is formed at a juncture between
25 the at least one annular flap and the main portion.

7. The carrier head of claim 1, wherein at least one of the annular flaps includes a
widened section adjacent a juncture between the at least one annular flap and the main
portion.

8. The carrier head of claim 7, wherein the at least one annular flap includes a
horizontal portion extending from the base assembly to the widened section.

9. A carrier head, comprising:

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a base assembly; and
a flexible membrane having a generally circular main portion with a lower surface that provides a substrate-mounting surface and a plurality of concentric annular portions extending from the main portion and secured to the base assembly,
5 the volume between the base assembly and the flexible membrane forming a plurality of pressurizable chambers.

10. A method of sensing the presence of a substrate, comprising:
evacuating a first chamber of a plurality of chambers in a carrier head that
10 includes a base assembly and a flexible membrane main portion with a lower surface that provides a substrate-mounting surface and a plurality of concentric annular portions extending from the main portion and secured to a base assembly of a carrier head, the volume between the base assembly and the flexible membrane forming the plurality of pressurizable chambers;
15 measuring a pressure in second one of the plurality of chambers; and
determining whether the substrate is attached to the substrate-mounting surface from the measured pressure.

11. The method of claim 10, wherein determining whether the substrate is
20 attached to the substrate-mounting surface includes comparing the measured pressure to a threshold.

12. The method of claim 11, wherein the substrate is determined to be present if the measured pressure is greater than the threshold.

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25 13. A carrier head, comprising:
a base assembly; and
a flexible membrane having a generally circular main portion with a lower surface that provides a substrate-mounting surface and a plurality of concentric
30 annular portions extending from the main portion and secured to the base assembly, the volume between the base assembly and the flexible membrane forming a plurality of pressurizable chambers, at least one of the annular portions including a notch.

14. The carrier head of claim 13, wherein the notch is formed at a juncture between the at least one annular portion and the main portion.

15. The carrier head of claim 13, wherein the at least one annular portion includes a plurality of notches.

16. The carrier head of claim 15, wherein a first notch of the plurality of notches is formed at a juncture between the at least one annular portion and the main portion and a second notch of the plurality of notches is formed at about a mid-point of the annular portion.

17. A carrier head, comprising:

a base assembly; and

a flexible membrane having a generally circular main portion with a lower surface that provides a substrate-mounting surface, an outer annular portion extending from an edge of the main portion and secured to the base assembly, and an inner annular portion extending from the main portion and secured to the base assembly, the volume between the base assembly and the flexible membrane forming a plurality of pressurizable chambers, the inner annular portion including a notch.

18. A carrier head, comprising:

a base assembly; and

a flexible membrane having a generally circular main portion with a lower surface that provides a substrate-mounting surface, an outer annular portion extending from an edge of the main portion and secured to the base assembly, and an inner annular portion extending from the main portion and secured to the base assembly, the volume between the base assembly and the flexible membrane forming a plurality of pressurizable chambers, the inner annular portion including a widened section adjacent a juncture between the inner annular portion and the main portion.

19. The carrier head of claim 18, wherein the inner annular portion includes a horizontal portion extending from the base assembly to the widened section.

20. The carrier head of claim 18, wherein the inner annular portion includes a rim section between the base assembly and the widened section.

21. The carrier head of claim 20, wherein the widened section includes a sloped
5 face on a side closer to the rim, and a generally vertical face on a side opposite the rim.

22. The carrier head of claim 21, wherein the rim section is connected to a top
10 vertex of the widened section.

23. A carrier head, comprising:
a base assembly; and
a flexible membrane having a generally circular main portion with a lower
surface that provides a substrate-mounting surface, an outer annular portion extending
15 from an edge of the main portion, a first flap connected to a top vertex of the outer
annular portion and secured to the base assembly, and a second flap connected to a
second vertex of the outer annular portion and secured to the base assembly, the
volume between the base assembly and the flexible membrane forming a plurality of
pressurizable chambers.

24. A flexible membrane for use in a chemical mechanical polishing carrier head,
20 comprising:

a generally circular main portion with a lower surface to provide a substrate-
mounting surface;
25 an outer annular portion extending from an edge of the main portion to be
secured to a base assembly of the carrier head; and
an inner annular portion extending from the main portion to be secured to the
base assembly, the inner annular portion including a notch.

25. A flexible membrane for use in a chemical mechanical polishing carrier head,
30 comprising:
a generally circular main portion with a lower surface to provide a substrate-
mounting surface;

an outer annular portion extending from an edge of the main portion to be secured to a base assembly of the carrier head; and

- an inner annular portion extending from the main portion and secured to the base assembly, the inner annular portion including a widened section adjacent a
- 5 juncture between the inner annular portion and the main portion.

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